Central States
Forest Health Watch

Current forest health information for land managers in Illinois, Indiana, Iowa and Missouri

May 23, 2007

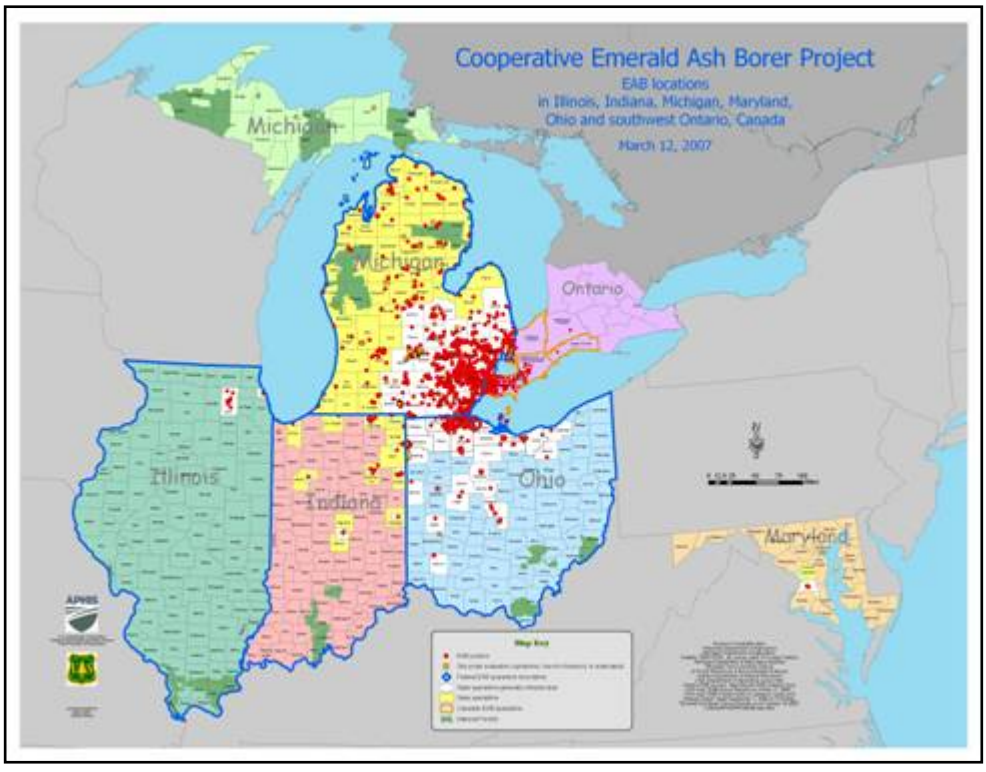
About This Newsletter…

This collaborative effort of the USDA Forest Service Northeastern Area, Missouri Department of Conservation, and Indiana, Iowa and Illinois Departments of Natural Resources will provide updates three times per year (Spring, Summer, Autumn) on forest health issues of regional interest. Useful information can also be found in previous editions, which are available on the www at http://na.fs.fed.us/fhp/fhw/csfhw/ .

Important Regional Forest Health Issues

Nonnative insects and pathogens continue to be highly significant forest health issues in our region. In this edition you will find updates on Emerald Ash Borer, Sudden Oak Death, and Gypsy Moth.

Emerald Ash Borer (EAB)



The latest development in EAB is the discovery of additional infested sites in Illinois, bringing the total number of known locations in Illinois to 10 sites in Kane County and 5 sites in northern Cook County.

Firewood produced by Taylors Wood Products Company within the EAB federal quarantine area in IL was distributed through Midwestern locations of Menard's in April. Press releases throughout the affected area instructed people who may have purchased the wood to burn any remaining wood before May 4th. Movement of EAB in firewood and other wood products continues to be a major concern. All Central States are implementing a major trap tree effort in 2007 to detect unknown EAB infestations.

The following website provides general information on EAB and links to specific information on the infestations in Michigan, Ohio, Indiana, Illinois and Maryland:
http://www.emeraldashborer.info/index.cfm

The Proceedings of the 2006 "Emerald Ash Borer and Asian Longhorned Beetle Research and Technology Development Meeting" provide updates on the most recent research on EAB, and are on the www at:
http://www.fs.fed.us/foresthealth/technology/pdfs/EAB_ALB_2006.pdf

Additional info on Emerald Ash Borer from Illinois: During 2006 ash trees in Kane and Cook Counties were found to be infested with the emerald ash borer (EAB). Staff of the Illinois Dept. of Agriculture has cooperated with USDA APHIS PPQ, USDA Forest Service, and The Morton Arboretum to conduct intensive surveys in those infested counties to determine the extent of the infestation. It is well known that tree borers such as the EAB are attracted to stressed trees where they deposit their eggs. As part of surveys for the EAB in Illinois, staff of The Morton Arboretum and the University of Illinois/Natural History Survey have selected ash trees throughout the state and purposely placed the selected trees under stress by removing about 10 inches of the encircling trunk bark in early- to mid-May. Such trees are referred to as trap trees. In 2006, most of the trap trees were placed throughout the state near industries using large quantities of raw wood, and where firewood might be used, such as parks and recreational areas. The trap trees were felled and debarked in late fall and examined for the presence of EAB larvae. There is good evidence to show that the beetle is expanding its range through the transportation of infested firewood. Do not move firewood from Michigan, Indiana, and Ohio or from any quarantined areas as the wood might be infested with the EAB. Although there are strict regulations prohibiting the transportation of firewood out of quarantined areas, a few people continue to violate the law.

EAB trap tree in Illinois. *Photo courtesy Jim Appleby.*

An informed public is very useful in finding infestations of exotic insects and plants. Discoveries of the Asian longhorned beetle and emerald ash borer in Illinois were made by informed private citizens. EAB meetings have been held throughout Illinois by governmental, state, and private agencies to inform the public about the insect. It is estimated that approximately 21,000 people viewed the EAB display in 2006 during the Illinois State Fair. Smaller 3'x2' posters have now been posted in many of the larger state parks in northern and central Illinois. A single page firewood leaflet as well as a 4 page leaflet "How to Diagnose, Detect, and Search for Infestations of the Emerald Ash Borer in Illinois" are available for distribution.

Gypsy Moth Activities – Spring 2007

States without established populations:		
	Treatment Activities	Trapping Activities
Iowa	None	A joint effort of IA DNR Bureau of Forestry, USDA APHIS, IDALS, and City Foresters will place approximately 5,000 gypsy moth detection traps across the state.
Missouri	None	MO Dept. of Agriculture, MO Dept. of Conservation, USDA APHIS, U.S. Dept. of Defense and MO National Guard will cooperate to set out over 9,000 detection traps in Missouri. Delimit trapping will be done in 4 counties where gypsy moths were captured last year (Franklin, Jackson, St. Louis, and Taney).

States with established populations:		
	Planned Treatment Activities	Trapping Activities
Illinois	Aerial spray of Btk on 9 sites (2,701 acres) and pheromone flakes on 4 sites (4,613 acres) in Northern Illinois. The intent of the treatment of these 7314 acres on 13 sites is to slow the spread of gypsy moth by eliminating reproducing populations on the treatment sites.	STS monitoring traps will be placed in the northern ¼ of the state. USDA APHIS traditionally places detection traps in the portion of the state not covered by the STS program and delimit traps in areas where moths were caught the previous year.
Indiana	Aerial spray of Btk on approx 7,321 acres (12 sites) and pheromone flakes on approx 22,786 acres (3 sites). The intent of the treatment of these 15 sites in 5 counties is to slow the spread of gypsy moth in northern Indiana. One eradication site (299 acres) is being treated with Btk in Delaware County (central IN).	Over 17,000 traps will be placed on 2K, 3K & 5K grids over the entire state. Delimit surveys are planned for all positive sites in front of the generally infested area using 250M, 500M or 1K grids.

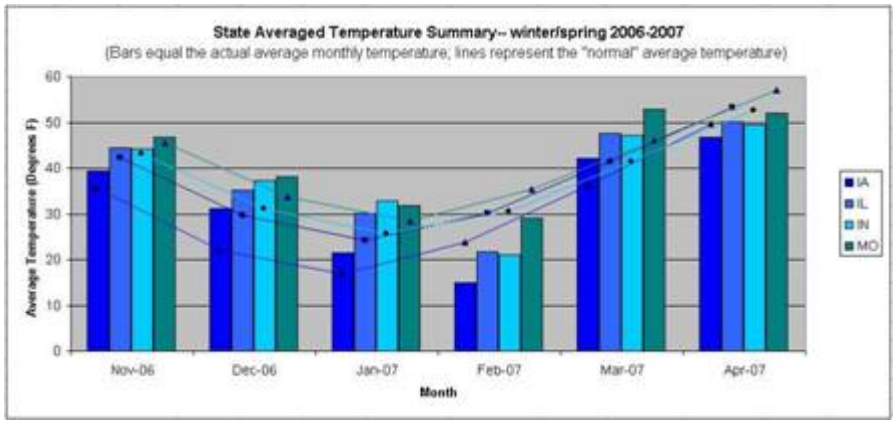
'Sudden Oak Death'

This year's cooperative detection surveys for *Phytophthora ramorum*, the pathogen that causes sudden oak death in forest environments, uses baiting for the pathogen with rhododendron leaves suspended in streams or rivers in 143 watersheds in 21 states. In the Midwestern states, 16 watersheds are being monitored as follows: three watersheds in Missouri, four in Illinois, five in Indiana, and two watersheds each in Wisconsin and Michigan. In early April, the Forest Health Monitoring (FHM) program detected *P. ramorum* outside the

known infested areas in California and Oregon, in waterways draining previously confirmed infested nurseries in the states of Washington and Mississippi. FHM is working closely with APHIS and state cooperators to use stream baiting to identify more definitively the sources of the pathogen in watercourses. Vegetation surveys are also being conducted close to the infested watercourses to determine if the pathogen is present.

Weather Overview

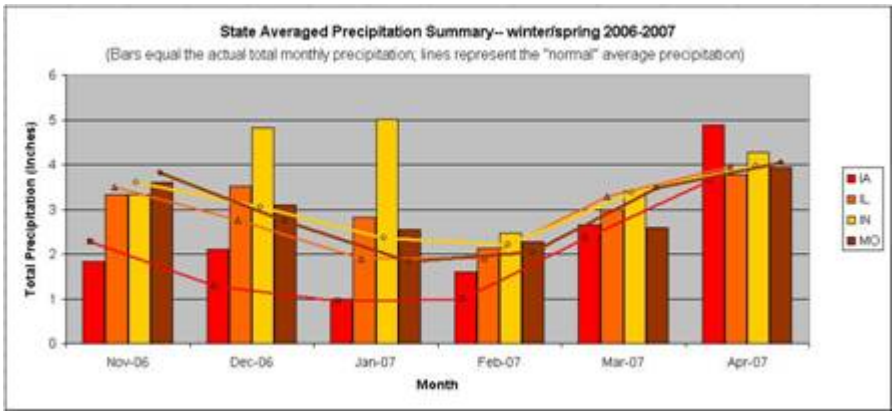
What were winter and spring like in the Central States? And how did our trees "feel" about this?!?



The chart to the right shows the normal average monthly temperatures for each of the four Central states, and the actual average monthly temperatures that occurred from November 2006 through April 2007. Generally November, December and January were above normal, February was far below normal, March was again above normal, and April was again below normal.

The greatest adverse effect on trees from this weather pattern was to plants that began to break dormancy following the warmer than usual January, but then got surprised by the cold of February and again in April. By early April, budbreak, flowering, and leaf formation ranged from 4 weeks ahead of schedule in southern and southwestern Missouri to two weeks ahead in mid-Missouri, to about normal in the northern portion of the state. In Indiana, budbreak and leaf expansion occurred in late March and was 3-4 weeks ahead in southern half of state. A "big chill" during the first two weeks of April included hard freezes throughout the region, so freeze damage occurred on fruit tree and other woody plants down into the southern portions of Missouri, Illinois and Indiana. In Missouri, significant frost damage was reported. In Indiana, the freeze created "defoliation" to oaks, maples and other species. Damage to flowers may reduce acorns (particularly white oak) and other mast and seed. In addition to the direct freeze injury to foliage, several opportunistic diseases may take advantage of the frost damage. Sycamore anthracnose, oak anthracnose, ash anthracnose, and maple anthracnose (all of which will return following our spring rains, if there is adequate moisture and cool temperatures) may gain greater access and produce more symptoms such as canker formation on severely frost damaged trees. Also, distinguishing between frost damage and anthracnose will become more difficult as spring progresses. Frost damage is more uniform in distribution across the crown, whereas anthracnose damage is more localized on the tree at the point of infection. In South eastern Indiana in the Forest Tent Caterpillar epidemic area, some forests will have the freeze defoliation followed by FTC defoliation, which will increase mortality in this area.

Precipitation was fairly close to normal across the region throughout most of the season, with the exception of much higher than normal precipitation in Indiana in December and January. We finished up April with no part of the Central States region in moisture deficit.



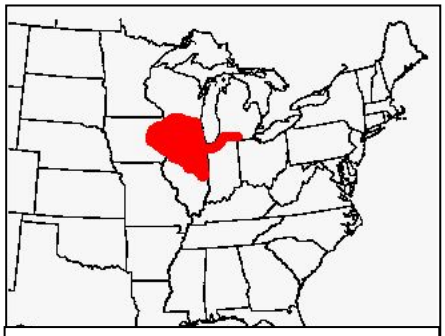
Climate data was obtained from subscription searches of the Midwestern Regional Climate Center's MICIS database. Other info was also obtained from "Midwest Climate Watch" at http://mcc.sws.uiuc.edu/cliwatch/watch.htm#

A Look into the Crystal Ball…

The **forest tent caterpillar (FTC)** caused significant defoliation of hardwoods (particularly oaks, sugar maple, black cherry and hickory) in the far Southeast corner of Indiana in 2006. This multi-state outbreak, which is centered in Kentucky, is expected to cause additional damage in 2007. Populations of the parasitic "Friendly Fly", *Sarcophaga aldrichi*, are increasing, which eventually will naturally collapse the FTC population. Some oak and maple mortality has been observed, and is expected to continue.

A large population of 17-year Periodical cicadas expected this spring

Thanks to Jim Appleby for this article.



The map was copied from: http://insects.ummz.lsa.umich.edu/fauna/michigan_cicadas/Periodical/BroodXIII.html

An emergence of the 17-year brood of the periodical cicada will take place in the spring of 2007 in many areas across northern Illinois, eastern Iowa, southern Wisconsin, and into Indiana and Michigan. Because of the huge numbers of cicadas that emerge, informational offices are often flooded with calls from the public as to what kind of damage the cicadas might cause and if control is needed. It has been reported that as many as 1.5 million cicadas can emerge from an acre of land. It is in late May or early June on some warm night especially after a recent rain when the immature cicada nymphs will emerge from the soil. They then will crawl up some vertical surface such as a tree trunk. A split will develop down the nymph's back and a winged adult cicada will emerge. About a week later the male cicadas will start singing in unison which sounds like the word "pharaoh." The male and female cicadas will mate and then after about 10 days the female cicadas will begin egg laying. The egg laying activity of the female cicadas in the twigs of various trees and shrubs will often cause the outer small twigs to die. The eggs hatch in the twigs about 5 to 6 weeks after they are laid. The young nymphs fall to the ground and burrow into the soil where they will feed on the roots of various trees for the next 17 years.

Although the tree injury can be rather unsightly, the natural pruning will not cause that much harm and control measures are usually not recommended. In areas that have had extensive land development in the last 100 years no emergence should take place. It is in the older parks, cemeteries, woodlands, and older neighborhoods where little soil disturbances occurred where cicada emergence will take place. On small newly transplanted trees fine mesh netting might be used to prevent the female cicadas from egg laying.

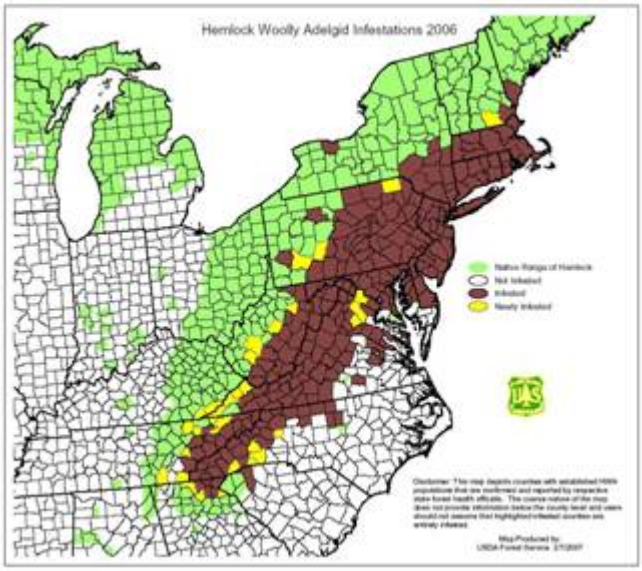
The following website tells you all you ever wanted to know about Periodical cicadas, plus some:
http://insects.ummz.lsa.umich.edu/fauna/michigan_cicadas/Periodical/

Twig dieback or "flagging" on swamp white oak, caused by cicada oviposition *Photo courtesy Jim Appleby.*

What else is being reported across the Region

In the May 2006 edition of CSFHW, we reported on the recent identification of two pathogens on hickory and the initiation of a new study on **hickory mortality**. During the summer of 2006, we collected samples from dying hickory in Iowa, Minnesota, and Wisconsin and began to look for common causes. We observed several types of insect damage, including hickory bark beetle, and were able to isolate a variety of fungi, including *Ceratocystis smalleyi*, *Fusarium* sp., and *Phomopsis* sp., from cankers. It quickly became clear that there are a number of factors and agents that are probably involved in causing severe hickory decline. The good news is that we were also able to obtain funding for additional research to clarify which agents are important. We will be surveying and studying additional stands in Iowa, Minnesota and Wisconsin during summer 2007, and possibly expand sampling into Missouri, Ohio, and New York in 2008. If you have sites with hickory

mortality which you would like to see included, contact the forest health specialist in your State's DNR/Dept of Conservation.



The natural range of hemlock extends into Indiana, but hemlocks are also planted throughout the Central States. Because of the value of hemlock in ornamental plantings, we should be aware of emerging threats to this tree in our area. **Hemlock Woolly Adelgid (HWA)** is a non-native insect that sucks sap from the young twigs. This feeding causes needles to discolor from deep green to grayish green and to drop prematurely, and retards or prevents tree growth. Defoliation and tree death can occur within several years. Signs of HWA infestation include white cottony sacs that resemble the tips of cotton swabs at the base of the hemlock needles. To prevent movement of HWA into non-infested areas, quarantines require inspection and "phytosanitary certification" for any hemlock plant material being shipped outside the infested area. In 2006, despite quarantine, infested hemlock trees were shipped from West Virginia and planted into a landscape setting in Michigan. Efforts are being made in Michigan to eradicate this introduction. However, the fact that this plant movement occurred despite the quarantine should cause concern throughout the region.

In response to concerns about hemlock health in Indiana, the DNR Nature Preserves and Forestry staffs are mapping all locations of hemlock in Indiana. Nature Preserve staff are including HWA in their normal survey work on their properties. Nursery inspectors are also putting special effort on Hemlock during their annual inspections.

Feature Topic: Will elms once again flourish in our forests? By Linda Haugen

Previous and current role of elms

The American elm (*Ulmus americana*) once held a position of prominence in our bottomland forests. The elm-ash-cottonwood forest type and other types containing elm are an essential component of riparian ecosystems. Reduction of the American elm component of riparian forests has major ecological implications, particularly in light of forest health threats to ash, maple and other riparian species.

Ophiostoma ulmi, the fungus that causes Dutch elm disease (DED), was introduced to Ohio on logs from Europe in 1928, and spread east and west over the ensuing 45 years, reaching the west coast by 1973. At some time during the spread of DED, another aggressive fungus, *Ophiostoma novo-ulmi*, which also causes DED, was introduced. We do not know the precise origin of either pathogen, although Asia is suspected. During the 1960's and 1970's, a wave of DED was sweeping through our Midwestern cities and towns. Concern over the losses focused on the urban elms, which were so important on our city streets. Meanwhile, millions of trees were also dying in our bottomland forests. Various sources indicate losses of 50% to over 90% of mature rural elms. However, despite losses to Dutch elm disease, over two billion American elms remain in forestland of the Northeastern Area.

Nearly all of our native American elm trees are susceptible to DED, which is vectored by elm bark beetles. Elm is a prolific seed producer and grows quickly, so many young elm trees remain in our forests. A few escape DED for many years and grow to be sizeable trees, but eventually most succumb to the disease. DED tends to move through our forests in "episodes" that may last for several years, but then subside. These

episodes follow the natural fluctuations in availability of host material (elms), populations of the elm bark beetles, and suitable weather conditions.

DED tolerant American elms

As DED swept across the North America, research projects were initiated to identify American elms that could survive the onslaught of the disease. Research was initiated in the 1930's at Cornell University and the Boyce Thompson Institute in New York and the Bureau of Plant Industry in New Jersey. Trees from these screenings were included in later projects at the National Arboretum (Dr. Alden Townsend and Dr. Larry Schreiber) and University of Wisconsin—Madison (Dr. Eugene Smalley and Dr. Ray Guries). American elms developed by the University of Wisconsin-Madison are now managed by the Elm Research Institute as the American Liberty multi-clone (meaning that they are marketed as a mixture of cultivars). The National Arboretum has also released 2 cultivars (Valley Forge and New Harmony) for commercial production. In addition, the horticultural variety 'Princeton' was identified as carrying high tolerance to DED. North Dakota State University is evaluating a number of American elm cultivars with high tolerance to Dutch elm disease, and has named a new cultivar, `Lewis & Clark' - Prairie Expedition™. University of Minnesota has also initiated a study to identify additional DED tolerant American elms and to determine the genetic basis for that tolerance. They are particularly interested in a selection from Minnesota named 'St. Croix'. The table on the following page summarizes most of the true American elms that may be encountered in a discussion of available cultivars.

Despite 70 years of research, the mechanisms of tolerance to DED are poorly understood. No American elms have been found which are completely resistant to infection. Tolerant trees are susceptible to infection by DED, but do not succumb. Some forms of tolerance are heritable, but much additional research is needed. One of our greatest risks is overplanting a few cultivars and narrowing the genetic basis of the elm population. A narrow genetic base puts the population of elms at risk for devastation by pests and diseases that may already be here or may emerge in the future: other species or strains of the DED fungus, elm yellows, bacterial leaf scorch, elm leaf beetles, or a myriad of other potential damage agents.

Current projects involving cultivars of American elm with tolerance to DED

National elm trial: This project was initiated in 2005 at 16 sites across 15 states (including Iowa and Indiana) to test the performance of commercially available DED-tolerant elm cultivars. Of the 14 cultivars initially included in the trial, 'Princeton', 'Valley Forge' and 'New Harmony' were the only true American elms. 'Jefferson' and 'Prairie Expedition' are being added as they become available. More information on this study is available at http://treehealth.agsci.colostate.edu/research/nationalelmtrial/NationalElmTrial.htm

Elm restoration project: Dr. Jim Slavicek of the US Forest Service Northern Research Station field unit in Delaware, Ohio, began elm restoration plantings in Ohio in 2003. In 2005 he worked with the St. Paul Field Office to expand these plantings into the Upper Mississippi Watershed. There are currently sites near Decorah, Iowa, La Crosse and Cassville, Wisconsin, and Hastings, Minnesota. Each site consists of 30 to 41 DED tolerant American elms planted into a wildland setting, where their progeny will be free to grow, which we hope will carry DED tolerance into the natural population. The varieties of elm we are planting include Princeton, Valley Forge, and Delaware. In order to capture the genetic basis of R18-2 and New Harmony on the sites, seedling crosses of Valley Forge by R18-2 and New Harmony were planted onto the sites in 2007. More information on this project is available at http://www.na.fs.fed.us/fhp/ded/elm_restoration_uppermiss.pdf

University of MN: The Department of Plant Pathology at the University of Minnesota has begun a project to screen American elms for tolerance to DED, and to try to determine the genetic basis for that tolerance. The Department of Horticulture at the U of MN also has studies to test the performance of elm varieties (not only American elm) in Minnesota. More information on this work is available at: http://www.tre.umn.edu/

National Arboretum/ARS: Dr. Alden Townsend, who led in the screening and development of many DED tolerant elms, retired from The National Arboretum and USDA Agricultural Research Service in 2005. The National Arboretum website indicates that their new research geneticist, Dr. Richard Olsen, intends to continue the work of evaluating American elm clones for DED and insect tolerance.

American elm cultivars with DED tolerance			
Cultivar	*Origin and notes*	*Commercial availability*	*Comments*
Princeton	Selected in 1922 by Princeton Nurseries in New Jersey for outstanding horticultural characteristics. Fortuitously, it is also DED tolerant.	Moderately abundant	This is the main cultivar being propagated by Riveredge Farms nursery (in Georgia) for distribution by Home Depot.
Valley Forge (Amer. 3)	Seedling selection made in Delaware, OH for DED tolerance by A.M. Townsend and L.R. Schreiber. Released 1995.	Moderate wholesale and mail order availability.	Of thousands of American elms screened by inoculation with the DED fungus, 'Valley Forge' was the most tolerant. Propagates easily. Form of young tree is sometimes difficult to manage.
New Harmony (Amer. 680)	Seedling selection made in Delaware, OH for DED tolerance by A.M. Townsend and L.R. Schreiber.	Low wholesale and mail order availability.	Of thousands of American elms screened by inoculation with the DED fungus, 'New Harmony' was the second most tolerant. Does not propagate as easily as Valley Forge, so is less abundant on the market.
Lewis & Clark 'Prairie Expedition'™	Origin is along Wild Rice River southwest of Fargo, ND. NDSU Research Foundation has released this elm for commercial production.	Starting in 2007	When inoculated with the DED fungus, this tree displayed high resistance. More info is available on the NDSU research foundation website at http://ndsuresearchfoundation.org/PrairieExpedition-RFM-37.htm
Jefferson (N3487)	Selected by the National Park Service in Washington, DC. Released for commercial production in 2005.	Starting, but still difficult to find.	Originally thought to be a hybrid between American elm (which is tetraploid) and unknown diploid parent. Recent DNA tests show it is fully of American elm origin. Description at http://www.ars.usda.gov/is/pr/2006/060613.htm?pf=1
American Liberty (W502, W503, W505, W507, W510, and M-8)	A collection of 6 clones selected by Dr. E. Smalley and Dr. R. Guries at the Univ of WI. 5 of the clones were derived from progeny of clones from WI & IA crossed with similar trees from Cornell University and USDA. Clone M-8 originated in Kansas.	Yes… through the Elm Research Institute (ERI).	In stringent trials conducted by the USDA ARS, the American Liberty multi-clone did not demonstrate high tolerance to DED, but ERI did not disclose the identity of the clones that were provided for the trial. Has shown some tolerance in other trials. W502 and W510 have performed well in some trials.
Independence (W510)	Patented tree, part of American Liberty multiclone. Originated from a controlled cross between 'Moline' (from Illinois) and 'W185-21' (from Iowa).	Yes, as part of American Liberty	Reportedly the most tolerant clone in the American Liberty multiclone.
Delaware 2 (Delaware)	Selected during the 1940's by the Bureau of Plant Industries, but never officially released. Origin of seed was North Dakota.	Not yet	Expressed significant tolerance in some studies, less in others.
R18-2	Originally selected by Cornell and the Boyce Thompson Institute.	Not yet	Susceptible to elm yellows. Was a parent in some of the clones included in American Liberty.
St. Croix	Selected from along the St. Croix river, near Afton, MN.	Not yet	Currently being tested by the University of Minnesota.

A look to the future and pitfalls to avoid

Many people are looking to these DED tolerant American elms for urban plantings. Because of the high cost of individual trees, operational plantings into wildland settings are less common. The US Forest Service has begun discussions with other agencies from the Upper Mississippi Watershed Forestry Partnership about ways

in which we can make larger quantities of DED tolerant elms available for operational plantings on State and Federal lands.

One of our greatest concerns for these DED tolerant elms, both in urban and rural plantings, is that only a few cultivars will be planted, and the genetic basis of elm will be narrowed. It is essential to try to plant trees of varied genetic background in order to avoid this pitfall. Unfortunately, only a few cultivars are currently readily available. There is a need to increase the nursery production of the less abundant cultivars of DED tolerant elms, and also seek to add new cultivars to our palette. With these steps, elm may once again flourish in our forests.

Sources and Resources:

Townsend, A.M., S.E Bentz, and G.R. Johnson. 1995. Variation in response of Selected American Elm Clones to *Ophiostoma ulmi*. J. Environ. Hort 13(3):126-128. Also on the www at: http://www.elmpost.org/report1.htm

Santamour, F.S., Jr., and S. E. Bentz. 1995. Updated Checklist of Elm (ulmus) cultivars for use in North America. Journal of Arboriculture 21(3): 122-131

Smalley, E.B., R.P. Guries, and D.T. Lester. 1993. American Liberty Elms and Beyond: Going from the Impossible to the Difficult. Chapter 4 (p. 26-45) in: M. B. Sticklen and J. L. Sherald (Editors). Dutch Elm Disease Research: Cellular and Molecular Approaches. Springer-Verlag, New York.

"Saving the American Elm" by Bruce Carley describes a special project through which the author is raising disease-resistant American elm trees for distribution in conservation areas and sale to interested individuals and organizations. The article contains many links, in addition to information on Dutch elm disease and on the cultivation and availability of DED-tolerant elms. http://users.aol.com/bcarley978/elmpost.htm

Other Resources and Sources of Information

The Northeastern Area of the Forest Service hosts a website with Forest Service publications on many important insect and disease problems: http://na.fs.fed.us/pubs/index.shtm

Forest Health Technology Enterprise Team (FHTET) of the Forest Service has produced a number of great publications, including titles like "Caterpillars of Eastern Forests", "Invasive Plants of the Eastern United States: Identification and Control", and "EAB and ALB Research and Technology Development Meeting (2006)". These are on the web at: http://www.fs.fed.us/foresthealth/technology/pub_titles.shtml#E

This newsletter is also available on the WWW at:

http://na.fs.fed.us/fhp/fhw/csfhw/

Northeastern Area

Indiana

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